Computing Curriculum Knowledge and Skills Progression Map

National Curriculum Subject Content

The core of computing is computer science, in which pupils are taught the principles of information and computation, how digital systems work, and how to put this knowledge to use through programming. Building on this knowledge and understanding, pupils are equipped to use information technology to create programs, systems and a range of content. Computing also ensures that pupils become digitally literate – able to use, and express themselves and develop their ideas through, information and communication technology – at a level suitable for the future workplace and as active participants in a digital world.

Pupils in KS1 should be taught to:

Problem Solving

- understand what algorithms are
- how algorithms are implemented as programs on digital devices
- that programs execute by following precise and unambiguous instructions

Programming

- create and debug simple programs

Logical Thinking

- use logical reasoning to predict the behaviour of simple programs

Searching

- recognise common uses of information technology beyond school

Creating Content

- use technology purposefully to create, organise, store, manipulate and retrieve digital content

E-Safety

- use technology safely and respectfully
- keep personal information private

Pupils in KS2 should be taught to:

Problem Solving

- design, write and debug programs that accomplish specific goals
- control or simulate physical systems
- solve problems by decomposing them into smaller parts

Programming

- use sequence, selection, and repetition in programs to work with variables
- work with various forms of input and output

Logical Thinking

- use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs
- understand computer networks including the internet
- understand how networks can provide multiple services, such as the world wide web

Searching

- use search technologies effectively

• identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies	• appreciate how results are selected and ranked **Creating Content** • select, use and combine a variety of software (including internet services) on a range of digital devices • design and create a range of programs, systems and content that accomplish given goals • collect, analyse, evaluate and present data and information **E-Safety** • use technology safely, respectfully and responsibly • recognise acceptable/unacceptable behaviour • know a range of ways to report concerns about content and contact • be discerning in evaluating digital content • understand the opportunities networks offer for communication and collaboration

Year 3

Problem Solving • design, write and debug programs that accomplish specific goals • control or simulate physical systems • solve problems by decomposing them into smaller parts **Programming** • use sequence, selection, and repetition in programs to work with variables		**Autumn**	**Spring**	**Summer**
	Key Knowledge	**We are Networkers** • Know that the purpose of a network is to join things together and understand why they are used • Know the key parts of a network and which components are connected • Know that components can be wired or wireless • Understand the role of a server and what is connected to it	**We are communicators (email)** • Understand the term Email. • Know what an attachment is. • Understand Emails should be appropriate and respectful. • Know that cyberbullying is bullying using	**We are programmers** • Know Scratch is a programming language and some of its basic functions. • Understand a loop is a reoccurring event. • Understand the term decomposition • Understand the term remix (Adapt)

• work with various forms of input and output **Logical Thinking** • use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs • understand computer networks including the internet • understand how networks can provide multiple services, such as the world wide web **Searching** • use search technologies effectively • appreciate how results are selected and ranked **Creating Content** • select, use and combine a variety of software (including internet services) on a range of digital devices • design and create a range of programs, systems and content that accomplish given goals • collect, analyse, evaluate and present data and information		• Know how information travels around a network • Know that countries are connected via wires to create the connected 'world wide web' • Know that computers are connected to the internet via routers and that routers connect to send information • Know that a website is a file saved on a computer • Know that websites are too big to send whole and understand that data is split into packets **Journey Inside a Computer** • Identify basic inputs and outputs • Know that a computer follows instructions • Understand the roles of inputs and outputs • Know some of the different components of a computer E.G. CPU, RAM, hard drive etc and how they work together. • Understand the difference between a tablet and a laptop or desktop computer.	electronics such as a computer or phone.	**We are data collectors** • Know a database is a collection of data stored in a logical manner • Know how to sort data • Understand the programmes that can be used to show data visually (Graphs) • Understand the vocabulary associated with databases (field, record, data)

E-Safety • use technology safely, respectfully and responsibly • recognise acceptable/unacceptable behaviour • know a range of ways to report concerns about content and contact • be discerning in evaluating digital content • understand the opportunities networks offer for communication and collaboration	**Key Skills**	**We are Networkers** • Recognise real world networks, including the school network • Be able to classify technology into categories, such as a network, a wired or wireless device • Be able to create a network map • Demonstrate how information moves around a network • Be able to create a text map of the journey of a file • Explain why an online video could be slow or buffer **Journey Inside a Computer** • Demonstrate how a computer sends and receives messages from input and output devices • Be able to create a clear diagram, on a computer, of how input and output devices work • Compare different types of computers. • Explain the parts of a laptop • Explain an algorithm	**We are communicators (Email)** • Send an Email • Send an Email with an attachment • Log in and out of an Email account • Reply to an Email	**We are programmers** • Use repetition in programmes • Explain how simple algorithms work. • Predict what might happen from the code provided. # # • Use loops # # • Extend existing code. # # # • Debug (fix) problems in code. # # # **We are data collectors** • Collect data • Use logical thinking to predict what a programme may be used for. • Sort and filter data • Use a database to retrieve information • Create charts to represent collected data.

Cross-curricular links		**N/A**	**N/A**	**N/A**
Year 4				
Problem Solving • design, write and debug programs that accomplish specific goals • control or simulate physical systems • solve problems by decomposing them into smaller parts **Programming** • use sequence, selection, and repetition in programs to work with variables • work with various forms of input and output **Logical Thinking** • use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs		**Autumn**	**Spring**	**Summer**
	Key Knowledge	**We are programmers (Scratch games) # # #** • Understand that a variable is a value that can change and how to create them on Scratch • Understand what a conditional statement is. **We are meteorologists** • Know computers can use different input devices to sense the	**We are collaborators (Website making)** • Know that a website is a collection of pages that are all connected. • Understand how a website is made up (Usually as a homepage and subpages as well as hyperlinks) • Understand what makes an interesting website	**We are collaborators (Google Docs/slides)** • Understand that software can be used collaboratively • Know the difference between helpful comments and suggestions and ones that are rude • Understand what media can be added to a presentation slide. **We are computational thinkers** • Understand pattern recognition means identifying patterns to

• understand computer networks including the internet • understand how networks can provide multiple services, such as the world wide web **Searching** • use search technologies effectively • appreciate how results are selected and ranked **Creating Content** • select, use and combine a variety of software (including internet services) on a range of digital devices • design and create a range of programs, systems and content that accomplish given goals • collect, analyse, evaluate and present data and information **E-Safety** • use technology safely, respectfully and responsibly • recognise acceptable/unacceptable behaviour		world around them (Sensor data) • Understand what a weather machine is and its functions • Understand green screen technology and how it can be used. # #		help them work out how code works. • Understand that algorithms can be used for a number of purposes.
	Key Skills	**We are programmers (Scratch games)** • Decompose a task into smaller parts # • Remix code # # # • Debug existing code # # # • Create an algorithm for a specific purpose # # # • Create a simple game # # • Incorporate variables to make code more efficient. # # **We are meteorologists** • Use green screen to change a background # # • Record video # #	**We are collaborators (Website making)** • Work collaboratively to create a webpage # # • Design and create a webpage for a specific purpose. # # • Inset images that have permission to be used. # # • Inset hyperlinks to other pages. # # • Use keyboard shortcuts for copy and paste. # #	**We are collaborators (Google Docs/slides)** • Identify what software can be used collaboratively online. (Google docs etc) • Create a range of online documents collaboratively including presentations, forms and spreadsheets. • Comment/ suggest improvements to someone else's work. • Share a document with someone • Add images and transitions to various work **We are computational thinkers** • Identify bugs in code

• know a range of ways to report concerns about content and contact • be discerning in evaluating digital content • understand the opportunities networks offer for communication and collaboration		• Use keywords to search the internet • Design a weather machine that records different elements of the weather • Record data in a spreadsheet • Sort data • Use data to create weather forecast		• Identify the purpose of code • Identify patterns • Create algorithms for a specific purpose • Identify the four areas of computational thinking • Decompose a problem into smaller parts. • Use computational thinking to solve a variety of problems. # # #
Cross-curricular links		**We are meteorologists** Link to Geography topic. Weather data collected from variety of countries in Europe.	**We are collaborators (Website making)** History topic – Website created linked to Egyptian topic.	**We are collaborators (Google Docs/slides)** Science – Can create Google slide about an investigation English/Topic – Piece of writing from your unit typed up together.
Year 5				
Problem Solving • design, write and debug programs that accomplish specific goals • control or simulate physical systems • solve problems by decomposing them into smaller parts		**Autumn**	**Spring**	**Summer**
	Key Knowledge	**We are networkers (search engines)** • Understand how search engines work # # • Understand how to check validity of websites # #	**We are designers (mars Rover)** • Understand what the Mars Rover is and its job • Know that the size of the RAM	**We are presenters (Historical figures)** • Understand the importance of having a secure password • Know that the first computers were

Programming • use sequence, selection, and repetition in programs to work with variables • work with various forms of input and output **Logical Thinking** • use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs • understand computer networks including the internet • understand how networks can provide multiple services, such as the world wide web **Searching** • use search technologies effectively • appreciate how results are selected and ranked **Creating Content** • select, use and combine a variety of software (including internet services) on a range of digital devices • design and create a range of programs, systems and		• Know what a web crawler is # # • Understand what copyright is # # **We are programmers (microbit)** • Know a Micro:bit is a programmable device • Know the link between coding on Scratch and the Micro:bit Understand variables	affects the processing of data • Know what numbers using binary code look like • Understand that RAM is random access memory • Know that simple operations can be used to calculate bit patterns • Understand bit patterns represent images as pixels • Know that data for digital images can be compressed • Know the difference between ROM and RAM • Understand how to use CAD software **We are animators (Stop motion)** • Understand what stop motion animation is	created at Bletchley Park. • Know the historical figures that contributed to technological advances in computing **We are composers # # # #** • Know a soundtrack is music for a film/video • Understand the use of loops • Know how to adapt music while preforming

<table>
<tr>
<td rowspan="2">content that accomplish given goals
• collect, analyse, evaluate and present data and information
E-Safety
• use technology safely, respectfully and responsibly
• recognise acceptable/unacceptable behaviour
• know a range of ways to report concerns about content and contact
• be discerning in evaluating digital content
• understand the opportunities networks offer for communication and collaboration</td>
<td></td>
<td></td>
<td>• Know that decomposing is breaking something into smaller parts</td>
<td></td>
</tr>
<tr>
<td>Key Skills</td>
<td><u>We are networkers (search engines)</u>
• Develop search skills to help find relevant information # #
• Use keywords effectively to aid searching # #
• Check the validity of information on the internet # #

<u>We are programmers (microbit)</u>
• Decompose a program
• Predict how software will work
• Write algorithms for a purpose #
• Program an animation #
• Use loops in programming #
• Debug code # #
• Use a range of programming commands #</td>
<td><u>We are designers (Mars Rover)</u>
• Use binary to send messages
• Translating binary code messages including binary calculations
• Compress data for digital images # # #
• Use logical thinking to explore software more independently, making predications
• Use 3D design software package TinkerCAD # # #

<u>We are animators (Stop motion)</u></td>
<td><u>We are composers</u>
• Predict how software will work #
• Write algorithms for a purpose #
• Use loops in programming #
• Debug code # #
• Use repitition in programming #
• Amend code within a live scenario #
• Create music using Sonic PI/Scratch #

<u>We are presenters (Historical figures)</u>
• Write algorithms for a purpose
• Debug a programme # #
• Remix existing code # #
• Create a presentation</td>
</tr>
</table>

		• Use repetition in a program #	• Decompose animations into a series of images # • Plan a program to tell a story # # Use video editing software to animate # #	
Cross-curricular links		**We are networkers (search engines)** Can be linked to any subject for research.	**We are animators (Stop motion)** Linked to History/Geography topic. Make space themed stop motion etc.	**We are composers** Linked to the music topic. Could add the composed music to the instrument/song being completed in Music.
Year 6				
Problem Solving • design, write and debug programs that accomplish specific goals • control or simulate physical systems • solve problems by decomposing them into smaller parts **Programming** • use sequence, selection, and repetition in programs to work with variables • work with various forms of input and output **Logical Thinking**		**Autumn**	**Spring**	**Summer**
	Key Knowledge	**We are programmers (Python)** • Know that there are text-based programming languages • Know what a nested loop is • Understand Python code **We are data collectors** • Know data within barcodes and QR codes can be used on computers	**We are data handlers** • Know that data can become corrupted. • Understand how to send data in packets. • Understand how to protect devices from hackers • Know the difference between mobile data and WiFi.	**We are presenters (creating a new product)** • Know what is involved in design of an electronic product • Know which software is best to achieve a specific purpose. • Understand the following terms: sequence, selection, repetition, variables, inputs and outputs.

<table>
<tr>
<td rowspan="2">

use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs
understand computer networks including the internet
understand how networks can provide multiple services, such as the world wide web

Searching

use search technologies effectively
appreciate how results are selected and ranked

Creating Content

select, use and combine a variety of software (including internet services) on a range of digital devices
design and create a range of programs, systems and content that accomplish given goals
collect, analyse, evaluate and present data and information

E-Safety

use technology safely, respectfully and responsibly

</td>
<td></td>
<td>

Understand infrared waves and how they transmit data
Know what Radio Frequency Identification (RFID) is
Understand that data is often encrypted and why

</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Key Skills</td>
<td>
<u>We are programmers (Python)</u>

Decompose a program into an algorithm
Write algorithms for a purpose
Debug a programme # #
Remix existing code # #
Use and adapt nested loops
Use the program language Python
Predict how code will work # #

<u>We are data collectors</u>

Identify barcodes, QR codes and RFID
Identify devices that can scan various codes

</td>
<td>
<u>We are data handlers</u>

Use spreadsheets creating formulas within
Use the collected data to solve a problem
Create a presentation

</td>
<td>
<u>We are presenters (creating a new product)</u>

Use search engines safely and effectively
Write algorithms for a purpose
Remix existing code # #
Debug a programme # #
Predict how code will work # #
Create and edit videos
Use design software TinkerCAD
Create a website

</td>
</tr>
</table>

• recognise acceptable/unacceptable behaviour • know a range of ways to report concerns about content and contact • be discerning in evaluating digital content • understand the opportunities networks offer for communication and collaboration		• Gather and analyse data • Use spreadsheets creating formulas within • Use the collected data to solve a problem		
Cross-curricular links		**<u>We are data collectors</u>** Date collected about a topic?		**<u>We are presenters (creating a new product)</u>** Linked to persuasive writing in English?